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TRANSLATION FROM RUSSIAN. OLSUFJEV, N. G. and PETROV, V. G. (1960).  
Discovery of Haemaphysalis concinna Koch ticks naturally infected by the  
tularemia agent.\* Trud. Inst. Zool. Akad. Nauk Kazakh. SSR, (12):54-56.

The number of ixodid ticks in which natural infection by the tularemia agent has now been determined exceeds 20. Of these, about one-third of the species occur in the USSR fauna. Among the number of vectors of tularemia infection, representatives of the genus Haemaphysalis have been recorded, particularly in USSR - H. punctata, and H. otophila, and in U.S.A. - H. leporispalustris, and H. cinnabarina. As regards H. concinna, there are no records in literature of finding this tick species naturally infected by the tularemia agent.

The tick H. concinna is widely distributed in USSR, particularly in the south of Belorussia and in Crimea, Caucasus, Uzbekistan, Kirgizia, Altai, Kemerovo Oblast, Northern Sayan Mountains in Eastern Siberia, and in the Far East (Serdyukova, 1956). It inhabits chiefly humid deciduous and mixed forests. Larvae and nymphs are parasitic on rodents and other small mammals, while adult ticks are on domestic and wild ungulates.

Our investigations were carried out in Starobardinsk locality in Altai region. A natural focus of piedmont-stream type was studied. The area in which these observations were carried out was located in the vicinity of Altai Mountains, on the border of forest-stepe and alpine taiga. The relief of the locality is sharply intersected by rather steep ridges and small hills, alternating with valleys along the bottom of which flow streams and small rivers that discharge into the Ishu River, a tributary of the Katuni River. In the investigated territory, Ixodes persulcatus, Dermacentor silvarum, and Haemaphysalis concinna were numerous; and also Dermacentor pictus and Ixodes apronophorus in small numbers. On large cattle, ticks of the first 3 species were encountered in a approximate correlation of individuals 2:1:1. During the period of maximal numbers, abundance index of H. concinna on cattle reached 20.

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In the spring of 1958, in one of the stream valleys, we collected ticks from vegetation with the aid of a flannel-flag. During the previous summer (1957) we had revealed an epizootic of tularemia among water rats, as well as infection of the stream's water by tularemia bacteria (Cisufjev, Kucheruk, Petrov, and others 1957).

The total of adult ticks collected during May was as follows: H. concinna - 436, D. silvarum - 458, and I. persulcatus - 611. These ticks were subject to investigation by the usually applied tests for this infection - biological tests on white mice. Ticks were divided in groups, 50 specimens (average) in each group, thoroughly washed in alcohol and physiological solution, and triturated in suspension; a 0.3 - 0.5 ml. dose of the later was inoculated subcutaneously into animals. In all, 28 white mice were utilized in the bioassays, including 3 bioassays with H. concinna suspensions, 10 with D. silvarum, and 10 with I. persulcatus.

Two white mice died from tularemia, in both cases they were inoculated with suspensions prepared from H. concinna. These 109 ticks were collected on 7 and 8 May along the banks of the stream in the sector where water rats infected with tularemia had been recorded during the previous year.

Both white mice died 4 days after inoculation of tick suspensions. At autopsy the following pathoanatomic changes typical for tularemia were revealed: dense infiltrate at the site of inoculation of suspension, enlargement of groin lymphatic glands, particularly on the side of the body where inoculation was made, acute hyperemia of subcutaneous cellulose vessels, enlargement and induration of the liver and spleen, change of the later into pink-raspberry colour, and acute hyperemia of the small intestine, etc. Impressions of organs and blood (taken from both mice) stained by Romanowsky-Giemsa method smears revealed enormous quantities of tularemia bacteria (up to III to IV points). By culturing of animal organs on curdled yolk media, pure cultures of the tularemia agent was isolated in both cases.

Morphological, tinctorial, and cultural properties of these cultures were entirely typical; they were distinctly agglutinated by antitularemic serum in 1:2000 dilutions of the later.

All mice inoculated with suspensions prepared from other tick species collected from vegetation survived; this shows non-infection by tularemia bacteria.

In the spring of 1957, while investigating adult ticks collected from cattle which grazed in the valley in the vicinity of the stream, where infected H. concinna were recorded, one culture of tularemia microbe was isolated from D. silvarum in a bioassay. During the previous year, we isolated 2 cultures of the same agent from D. silvarum ticks collected from cattle in the neighboring settlement. According to literature data, this tick species has now been known for a long time to be the vector of tularemia infection (Karlova and Popov, 1944).

Revealing of H. concinna ticks naturally infected with tularemia bacteria indicates their ~~undoubted~~ participation with L. silver in the circulation of the agent in the studied natural focus. During the summer, H. concinna larvae and nymphs were encountered in great numbers on water rats and other small rodents in the valley in the vicinity of the stream. In laboratory rats (Petrov), transmission of tularemia infection by H. concinna nymphs was demonstrated.

#### Conclusion

- 1) Naturally infected Haemaphysalis <sup>concinna</sup> ~~concinna~~ ticks have been revealed; and this has been demonstrated for the first time in this tick species.
- 2) Cultures of tularemia microbe isolated from H. concinna ticks were quite typical in their basic properties.
- 3) H. concinna ticks can participate with other ixodid tick species in maintenance of natural tularemia foci.

#### Literature

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